DOCUMENT RESUME

ED 100 536 PS 007 706

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TITLE Human Development, Stages of Cognition, School Readiness and Social Deprivation: A Rationale Based on Piaget and a New Theory of "Bioplasmic Forces".
PUB DATE [74]
NOTE 16p.

EDRS PRICE MF-$0.75 HC-$1.50 PLUS POSTAGE
DESCRIPTORS Abstraction Levels; Academic Achievement; *Child Development; *Cognitive Processes; Developmental Psychology; *Energy; *Growth Patterns; *Human Development; Interdisciplinary Approach; Maturation; Psychological Studies; Readiness (Mental); Retardation
IDENTIFIERS *Bioplasmic Forces; Piaget (Jean)

ABSTRACT

A theory of energy forces developed in the USSR seems to substantiate the suggestion that academic learning before a child is maturationally ready will reduce his learning potential. The bioplasmic model explicates physical/mental development, cognition, readiness, and deprivation. The invisible but recordable bioplasmic forces facilitate physical growth and are the basis of cognition. The forces are gradually released from physical growth for cognition at ages 7 (concrete), and 14 (formal). Readiness--cognitive capabilities--are determined by the quantity of available forces. Premature learning is ineffective and robs the body (brain), of its full potentialities, causing premature plateauing of cognitive and learning capacities and emotional maladjustments later on. Educational methods and curriculum should be made more compatible with and supportive of the growth forces of the child. (Author/CS)

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HUMAN DEVELOPMENT, STAGES OF COGNITION, SCHOOL READINESS AND SOCIAL DEPRIVATION: A RATIONALE BASED ON PIAGET AND A NEW THEORY OF "BIOPLASMIC FORCES"

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A new theory of energy forces developed in the USSR seems to substantiate the suggestion that academic learning before a child is maturationally ready will reduce his learning potential.

Certain studies in child and cognitive development suggest that academic learning before a child is maturationally ready will reduce his learning potential.[1]* A new theory of energy forces in human growth and development seems to substantiate this suggestion. The purpose of this paper is to present this theory and discuss stages of cognitive development, school readiness, and environmental retardation.

In brief, the theory of energy forces indicates that schools are wasting the energy needed for growth during a child's formative years by forcing premature intellectual learning of school subjects which could be more readily and easily mastered at a later age. It has an important bearing on the question, What are the effects of premature schooling?

There is presently a drive for early schooling. Some of its promoters propose formal schooling as early as age 4. This "hurry-up-and-learn" philosophy has roots in the knowledge explosion and is furthered by concern for minority children whose home environment is inadequate. First, upper-grade subjects were pressed down into the lower grades. Now primary-grade subjects have become more intellectual and abstract. This has happened, for example, in the new math and science programs. But research in child development does not support the "hurry-up-and-learn" concept. It indicates that a child is not ready for academic or intellectual learning until age 7, 8, or sometimes 9.[2] The child's brain is not fully insulated or completely developed physically until age 8. Some psychologists put the age of readiness at 11, but Jean Piaget, the noted Swiss psychologist, has shown that a child does not have adequate control over his thinking until at least age 7 or 8. At this age there is a shift from the preoperational to the concrete operational level of thinking, and the child can then perform new cognitive operations.

Neither is the child's intersensory development - sight and hearing - fully developed until age 8 or later. For example, before age 7 a child has perceptual difficulties; he often cannot distinguish visually between b and d and q and p.[3] He cannot hear the difference between b and p; m and n; g and k; s and z, etc.[4] Few preschool programs have been effective in producing lasting gains in academic learning or intellectual development. Preschool academic and language training programs have generally been no more effective than the unstructured, play-type preschool programs in enhancing learning abilities.[5]

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* Recent Stanford University Research Report states that adolescence--not early childhood --is the best time for intellectual development.(ref. 1)

It is well known that forcing a child to learn a skill or master a subject before he is maturationally ready is inefficient and may be ineffective. It takes him longer to learn it, and the learning is less complete. Moreover, children who begin reading at age 6, one year ahead of their class peers, are often one year behind them in reading achievement at the end of the seventh grade.[6] Not only do later school beginners surpass those who started school at an earlier age, but the latter group seems to have greater emotional and social adjustment problems. Forced cognitive maturity may sacrifice emotional maturity. The retention level of immature learners is much less than that of somewhat older learners. Forced learning can cause frustration, anxiety, alienation, and loss of interest in learning. The learning is not only inefficient or "pseudo-learning," but research indicates a resultant lowering of learning capacity. Forced learning may result in a permanent learning handicap - not only a distaste for a certain subject but permanent intellectual retardation.[7] Why is this so?

Until very recently, educators have spoken about school readiness in generalities, e.g., as "the amount of learning that can transfer to new learning," or, "the child must be mature in terms of physical, mental, and emotional growth and social maturity." However, none of these points of view really explains readiness or the possible damaging effects of early schooling.

As Arthur Jensen states, these "disagreements (regarding readiness) arise only when we try to explain readiness."[8] The reason for the disagreement as to when a child is or is not ready for schooling is that we lack a sound theory of human development. We do not understand the processes of physical and mental development and their relationship. We therefore have no agreed-upon concept of readiness.

This lack of understanding of readiness is reflected in the vagueness of educational objectives expounded by educators. Vague and general objectives --"the harmonious development of the talents and capacities of the child", and so forth, cannot provide a realistic basis for education methodology. It is not that these types of objectives are incorrect, but for providing a realistic foundation for education they are as viable as it would be to say of a machine that all its parts must be brought harmoniously into action. To operate a machine you cannot realistically approach it with truisms and phrases but with real and detailed knowledge. This lack of detailed knowledge of human development has led to a myriad of developmental and learning theories.

Let me explain. At this time educators do not have a total or realistic theory of human development. Mental and physical development are two separate phenonemena. Psychological and physiological development are thought to be two ways of viewing human development. The physiologist is primarily concerned with the organic, somatic, and physical aspects of man, whereas the psychologists is concerned with mental, psychological, and motivational aspects of development. In regard to offering a unifying or total theory of human development, the two fields have remained separate and impotent. Attempts have been made to develop a mental/physical conceptual model of human development using such theories as vitalism, mechanism, and the organismic and field theories.[9] These theories or models do not explain the relationship between physical and mental growth, mental maturation and readiness. One limitation of the theories was the attempt to apply concepts that explain the inorganic world

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to the organic world.[10] It is becoming increasingly evident that the forces operative in the inanimate world cannot explain the phenomenon of life. Therefore, this paper offers a new theoretical model, based on the bioplasmic theory. Since bioplasmic forces are invisible, though their effects are recordable, a model is necessary.

What is meant by a model in this context? Models or hypotheses are merely perceptual aids to explain phenomenological relationships. In an effort to gain a fuller understanding, the model is refined and differentiated. It becomes the criterion by which we test and judge the accuracy of our reasoning and provide a sufficient comprehension of the subject to facilitate inquiry and possible validation of the model. Is this not a valid approach for a theory of human development based on invisible forces? After all, no one has ever seen magnetism, gravity, or electricity, only their results and effects. The same applies to the atomic theory; no one has seen an atom, electrons, etc. Nevertheless, we borrow a model from the macrocosmic world - the planets and galaxy - to explicate our physical/chemical world through the use of the atomic theory, which is a microcosmic model of the universe. These models or scientific theories become laws when they consistently explain physical phenomenena.

What is the bioplasmic model? The bioplasmic forces theory is based on the concept that all living matter is made up of an energy body and a physical body, as concluded by Russian scientists and homeopathic and acupuncture physicians. Apart from the bioplasmic theory, biologists developed a term - "electrometabolic fields" - to explain the relationship between the electrical phenomenon and the metabolic processes in the body. The bioplasmic forces theory goes a step further; it is more comprehensive in its explanation of human development. Russian psychologists and scientists have recently discovered energy or "bioplasmic" forces to be the basis for human growth and development. The Russians were not the first to develop the concept of the bioplasmic forces. Rudolf Steiner over 50 years ago stated:

> The forces that hold sway in the etheric body (bioplasmic forces) are active at the beginning of man's life..., and most distinctly during the embryo period; they are the forces of growth and formative development.

The Russian findings gave visible proof to the premises of Steiner, the Chinese art of medicine, acupuncture, which works on the same principle, that there are energy-regenerative currents flowing throughout the body. This energy is spent on the vital jobs of growing into maturity and keeping the body chemistry and organs functioning properly. It changes the minerals of the body from an inert to an active state, facilitating the reproduction and regeneration of organs and body cells, etc. The energy used for maintaining bodily functions is measured as basal metabolism. The remainder is available for growth and activity. Basically, the source for this energy is nutrition and respiration. However, other factors can affect it, such as physical health, emotional well-being, and the environment. Mental health can affect physical health and growth, just as physical health can affect our emotions, hence behavior. The reaction is cyclical.

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Energy output varies with age. As we grow older we are less energetic and physically active, whereas the child has an abundance of energy. He expends much energy through growth, play, and other physical activity.

We have observed this phenomenon in daily life, in the organic world. Now Russian scientists have begun to explain it in new terms. They have actually photographed bioplasmic force. Sheila Ostrander and Lynn Schroeder, who visited research centers in Russia, report "a brand new concept in Russia, report "a brand new concept in Soviet biology" in their book, Psychic Discoveries Behind the Iron Curtain.[12]

Russian experiments indicate that the energy body we are talking about is not just a chaotic system of particles but a unified body which acts as a wholistic, structured, organized unit. Each organ of the body seems to have its own unified, specific etheric or bioplasmic forces. The forces are in continuous motion and metamorphosis. They are responsible for the maintenance of all the elements in the body to keep the organism going and to keep it healthy.

Acupuncture, as a means of correcting bioplasmic imbalance, is based on energy levels or current flows, which sustain the development and replacement of cells in the body.[13] Chinese physicians state that the skin, liver, kidneys, etc., are temporary deposits for a number of energy current flows which move at various rates throughout the body. Recent physiological studies have shown that the liver is changed in 10 days, the tongue in a longer period. The substance of the brain takes longer, while it is six months before new molecules are found in the bones. The hair and nails regenerate rapidly, whereas it takes seven years before all the skin cells have been replaced.

The basis of health, says the acupuncture physician, is the balance of energy currents in the body. "Good health is the free and unimpeded circulation of energy - the life forces - flowing from organ to organ along an invisible network of intercommunicating channels," which affects the flow of blood to the organs and tissues. Illness is then the blockage and imbalance of the flow of these bioplasmic currents. The insertion of needles in one or more of the energy centers or acupoints on the skin revitalizes and facilitates the energy current flow, putting the organism back in balance.[14]

It is worth mentioning that these bioplasmic forces account for the phenomenon called "the phantom limb." Persons who have a missing leg or arm as the result of a birth defect or an accident can sense the missing limb. A study by E. Weinstein and his associates has shown that among 101 children born with missing limbs, 18 had clear perception of phantom limbs.[15] George Von Arnim theorizes that the bioplasmic phantom limb is a phenomenom that accounts for the equal rate of body scheme acquisition by limbless, sightless, and normal children.[16] In other words, the bioplasmic forces contain the pattern or framework of the species, the dynamic processes or energy forces for growth. They facilitate the development of the physical limb when the physical material is present. The phantom or bioplasmic limb grows and develops just like the physical limb, except that it is nonmaterial, invisible. Steiner described the bioplasmic forces or body in a similar manner:

> All the organs of the physical body are maintained in their form and configuration by the currents and

> movements of the etheric body. Underlying the physical heart there is an 'etheric heart', underlying the physical brain an 'etheric brain' and so on... And where in the physical body there are distinct and separate parts, in the etheric (bioplasmic) everything is in living flow and interpenetrating movement. [17]

The Russian scientists who photographed the bioplasmic body confirmed this:

> The energy body didn't merely seem to be a radiation of the physical body, The physical appeared somehow to mirror what was happening in the energy. [18]

Another characteristic of bioplasmic forces is their regenerative power in lower animals, e.g., the flatworm, cut in half, completely regenerates itself; the same is true of an amphibian's legs and the fins of a lungfish. However, higher animals, particularly man, do not have this regenerative power. Instead, the formative or bioplasmic forces are transmuted into the powers of cognition, the power or energy to control thinking. [19] This concept of growth forces transmuted into cognitive energy has been known in acupuncture and homeopathy for years. [20]

The dual role of the bioplasmic force or body in man is important to the understanding of its nature and the basis of this paper. Steiner pointed out:

> A portion of them (the bioplasmic or etheric forces (development of a man's) life from this formative activity, then becomes the forces for thought... It is of the utmost importance to know that the ordinary-thought forces of man are the forces of man are the forces of bodily growth and formation, refined and sublimated. [21]

Part of the forces of the bioplasmic body are used for the development and maintenance of the physical body and the other part becomes manifest in the mental life in the form of thought. Apparently the continuity of the physical and the mental is evidently never broken. This relationship between thought and the physical body-forming process, has important educational significance. This bioplasmic or etheric forces theory, as Steiner called it, has been the foundation of the learning theory and practices being used in the more than 100 Waldorf Schools that he and his students founded.

What does all this mean for the education of the child and readiness for schooling? As I have indicated, energy or bioplasmic forces are used for human growth and maintenance of the body as well as for motor, emotional, and thinking activities. All of these require the expenditure of energy in one

form or another. Each person has a certain amount of energy available. The crux of my argument regarding the damage school does to children is that, as a result of an inappropriate curriculum, activities, and assignments, children's energy forces are displaced and atrophied prematurely, causing damage to their development.

How does this occur? As every teacher knows, the most formative years of childhood are the first seven. This is the age of imitation, play, and physical activity. It is also the period when the greatest growth rate occurs. It is the time when the energy level is high and the bioplasmic forces are concentrated mainly on physical growth. In a sense, the child grows from the head downward. He gains greater and greater voluntary control over his movements, speech organization, and thinking. This theme of voluntary control is very important to understanding the transformation of growth or energy forces.

The child at birth has no control over his chaotic eye, mouth, head, and neck movements. Movement control proceeds to the shoulders, arms, and hands; eye/hand coordination becomes possible. An infant is generally able to grasp objects by the third month. He sits up by the fifth month. His speech changes from cooing to babbling. By the twelfth month he toddles and begins to walk. He has by this time developed a minimal level of control over his physical movements. Along with motor development comes speech development which correlates better with motor development than it does with age. The child's speech development proceeds through the stages of cooing, babbling, saying (an expressing of inner needs and instincts - hunger, etc. - and the imitation of words), naming, talking. At the same time, speech could also be considered a finer form of motor movement (the lower jaw is a fifth limb, in a sense); the child gains greater mastery over his speech organization by use of the finer muscles of the mouth, tongue, lips, teeth, and larynx.

The rate of language development and vocabulary acquisition is slowed down when the child is struggling to master walking, running skipping, hopping, etc. The rate increases when his mastery over locomotion reaches a plateau; for example, at age 2 1/2 to 3, when he can jump with two feet, stand on one foot, tiptoe, and climb stairs using alternate feet, the child's vocabulary increase to 1,000 words, understanding increases considerably, and his utterances are fairly correct grammatically. As a result there is a displacement of energy from gross motor control to the finer motor control of speech.

Karl Konig has also worked out a descent of the development of grammar in children from the "head to the toe" - from nouns to the cognitive; adjectives to the affective; verbs to the psychomotor, as follows:

	Age	Nouns	Adjectives	Verbs
Cognitive	1.3	100%		
Affective	1.8	78%	22%	
Psychomotor	2.0	63%	14%	23%

Hence there seems to be a correlation between grammatical development and motor control.[22]

Physical and speech development are controlled motor movement - one gross, the other fine. Thinking, which is a form of control over one's mind, is also a much finer and more subtle form of movement.

Piaget has shown that all children's minds evolve through a series of intellectual stages as they progress from early childhood through adolescence. He has classified these as follows:

1. Sensory-Motor Stage (0-2 years)
2. Preoperational Stage (2-7 years)
3. Concrete Operational Stage (7-12 years)
4. Formal Operational Stage (12-15 years and over)

Each of these stages has its own particular characteristics. Studies demonstrate that children's thinking shifts from the sense-bound to the emotional to the rational forms of expression. The stages signify different centers of control. Piaget has devised tasks to determine the level of a child's thinking.

Before the shift from the preoperational to the concrete operational levels, the child "is involved in direct perceptual relationships with a minimum of reasoning or thinking." He is not able to distinguish between how things look and how they really are. If the form of an object is changed, he thinks the quantity is different. One experiment is the changing of one of two spherical clay balls of equal size into a sausage shape. The child does not understand that the sausage has the same quantity of clay as the ball from which it was rolled. The preoperational child will generally say the sausage shape is larger than the ball, even though he saw the experimenter roll the ball into a sausage. The child cannot conserve (retain a mental image of the two clay balls), nor reverse his thinking (compare the sausage with its prior ball shape, which should be retained as a mental picture if he is mature enough). The child who has attained the concrete operational level of thinking is able to perform this and smaller tasks successfully. I have devised an outline of the mental characteristics of the three major stages:

Preoperational (2-7 years)

1. Cannot conserve (hold mental images)
2. Thinking is perceptual or sensebound.
3. Thinking is nonreversible.
4. Cannot deal with variables or changes.
5. Has little control (voluntary) over thinking.

Concrete Operational (7-12 or 14 years)

1. Can conserve (hold mental images)
2. Thinking is bound to emotional or affective life, but operational/
3. Thinking is operational.
4. Has greater voluntary control over thinking.
5. Thinking is pictorial.
6. Needs concrete props to support problem solving.
7. Can deal with one variable.

Formal Operational (14 years and older)

1. Thinking is under voluntary control, i.e., it is operational.
2. Thinking is relatively free of physical and emotional life, more objective.
3. Can manipulate two or more variables.
4. Thinking is more flexible.
5. Predictive problem solving is possible without concrete props.
6. Can manipulate symbols and concepts without outer perceptual props.

As one examines these three stages in terms of their developmental sequence, it appears that the theme of increased voluntary control over thinking processes (movement) is just as applicable as it was to physical locomotion and speech development. However, in the Piaget stages, movement in cognition is more refined, sophisticated, and subtle. These transitional periods, from preoperational to concrete and from concrete to formal, are marked by definite physiological and biological changes.

The terms used by Piaget are realistic; they accurately describe the thinking, joining mental image to mental image, concept to concept, idea to idea. The child has not matured enough to be able to control his own thinking; he cannot reason. His thinking is nonoperational, noncontrollable, to a certain extent. At the concrete level, the older child can retain mental images and reverse his thinking; in short, his thinking is operational. He has control over his mind but needs concrete objects to solve problems. The same pattern of voluntarily controlled movement applies to change from the concrete to the formal operational level of thinking. Here the youngster can solve problems and predict solutions by making an educated guess - hypothesizing. He no longer needs concrete props to solve problems. He can solve such symbolic problems with several variables, e.g., when A is greater than B and B is greater than C, what is the relationship between A and C? His thinking is symbolic.

Piaget states that for a child to learn and actually experience what he is learning, his thinking must act on it, transform it, modify it. In other words, operate on it. The level of operation is determined by the maturation of the organism - the development of the growing child.

I have advanced the theory that motor activity and the development of speech and thinking are dependent upon gaining voluntary control over these areas The displacement and expenditure of energy are integral parts of the maturing process. Physical or organismic (total) maturation of the child is needed if he is to proceed through these stages at the proper rate.

The changes in thinking levels occur at about seven-year periods: preoperation (2-7), concrete operation (7-14), and formal peration (14 and older). The significance is that certain major physical changes or plateaus also occur in sever-year periods. These are the change of teeth (second dentition) at age 7 and puberty at approximately age 14. If we keep the theory of the transmutation of growth of bioplasmic forces in mind, it is no coincidence that at about age 7 (average age, 6.8 years), second teething occurs at the same time as the child's intellectual shift from the preoperational to the concrete operational level of thinking. In a 1923 lecture, Steiner described the relationship between second

dentition and the releasing of the bioplasmic forces for cognition at age 7:

> Up to the change of teeth, this etheric body of formative forces is most intimately bound up with the physical body; it is the force which drives out the teeth. When the human being gets his second teeth, the part of the etheric body that drives the teeth out has no more to do for the physical body... the inner forces which have pressed the teeth out are freed, and with these etheric forces we carry on the free thought (concrete operational) that begins to assert itself in the child from the seventh year onwards. [23]

Francis Ilg and Louise Ames report the results of their study on second teething of 80 children in relation to school readiness.[24] Those children who were ahead of schedule in teething (96%) were definitely ready for and could profit from academic school experiences. Of those children who were behind schedule in teething, 54% should have repeated (22% of this group did repeat), and 40% would have profited by repetition. Of those children who were in between - whether ahead or behind schedule in teething - 64% would have benefited by repetition (14% of this group did repeat; 36% were hard workers, doing well). The study indicates that subsequent to teething the children seemed to have reached a higher level of mental development - the concrete operational level of thinking.

What does all this signify for our theory of maturation? It means that second teething is an indication of the culmination of physical growth of the head. The head has reached a plateau of physical maturation. The brain has reached 95% of its development, the head two-thirds of adult proportion. This signifies that the growth, energy, or bioplasmic forces have to a certain degree completed their task in the physical development of the head and brain. The growth forces are then released (gradually) from physical growth for the processes of thinking (subtle movement); this accounts for the transition from preoperational (noncontrollable) to concrete operational (controllable) thinking in the child. The child now has greater voluntary control over his thinking processes.

This same relationship applies to the onset of puberty and the child's change from the concrete operational to the formal operational level of thinking. J. D. Nisbet found that in England those adolescents who attained puberty scored higher on intellectual and academic achievement tests than those youngsters who were still at the prepuberty stage of development.[25] During this time there is a growth spurt; the teen-ager is reaching adult proportions. The energy or growth forces are then released to be used for the higher level of formal operational thinking. There has not been much research on this level. However, there are indications that there is a delay in the attainment of the formal operational level of thinking even after the attainment of puberty. Physical maturation seems to have raced ahead of mental development at this later stage. No one really knows the reason; further research is needed.

As we have indicated, the child is not fully mature and ready for learning until age 7 or 8. His brain is not fully developed, nor are his senses of hearing and sight. I hold that if the child has not reached the indicated levels of maturity and is forced or persuaded to do intellectual learning, there occurs a

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premature use of the bioplasmic or energy forces for thinking. The physical body is robbed of the growth forces needed to develop the brain (the head) to its fullest potential for physical growth. The difference in growth of the brain may be so subtle that it cannot yet be measured. But nevertheless it does occur. There is also an inefficient use of the energy forces. When the child is still at the preoperational stage, in no sense of the word can he be forced or coerced to a higher level of thinking. Therefore little is accomplished by trying. The learning is of a pseudo or partial nature, incomplete; furthermore, physical development as well as emotional development have been sacrificed as a result. A. Portman reports, "Whenever acceleration has occurred, there has been a noticeably increased susceptibility to certain diseases, especially those of psychological origin."[26]

Shortened processes of maturation cause later immaturity. This would account for the increased maladjustment of early school entrants found by Inez King.[27] Learning is hardly ever a purely cognitive process, particularly with children, but includes emotional involvement - interest, motivation, and preference. Children who are forced to learn subjects beyond their capacity and maturation develop anxiety and frustration; in short, they are "turned off." Emotional fatigue can cause physical fatigue, a dissipation of energy, mental and physical.

When Russian scientists photographed the energy or bioplasmic forces, they found that illness, emotions, fatigue, and particular thoughts and states of mind have a distinct effect on the flow of bioplasmic forces throughout the body. When a person is fatigued, tired, or emotionally overstrained, more energy appears to pour out of the body than when he is in a healthy mental state of mind. So it is with the child who is forced prematurely into learning. It follows that as a result of the state of unreadiness for learning, the resulting frustration and anxiety cause the bioplasmic forces to dissipate. The bioplasmic forces available for physical growth and activity are accordingly reduced. Retardation is the final result, for there are two factors working against the child: the depletion and ineffective use of the growth forces resulting from premature attempts at thinking (pre-operational level), and the degradation of the growth forces resulting from frustration and anxiety.

The plasticity of intelligence decreases with age; forced learning accelerates this loss of plasticity because of premature dissipation of the bioplasmic forces.

Steiner stated:

> If we force intellectual powers in the child we arrest growth... certain organic processes that tend inwardly to harden the body are brought into play.[28]

This means that the bioplasmic forces are too soon diverted from their primary task of the development of the physical body. Therefore, the physical body remains less plastic and mobile; physical maturation sets in prematurely.*

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* Perhaps this one reason that young people mature physically sooner than did their ancestors. In 1850 girls, internationally, reached menarche at age 17, today it is 13.5 years, a decrease of approximately 4 years in a century.[29]

The child's intelligence and his learning capacity become differentiated and fixed early; this, in turn, limits the quantity and quality of experiences he can have. His intellectual and learning potentials reach a plateau prematurely.

If premature educational pressures have these kinds of effects on normally reared or middle-class children, what must be the effect on children from socially and culturally deprived environments? The result is disastrous. It is well known that the public schools have never been able to educate the poor very successfully. Compensatory and Head Start programs have generally been a failure, despite enormous effort and the expenditure of considerable sums. As a result of poor environment, the deprived child begins school with a handicap. In short, he is environmentally retarded, which affects his mental and academic capacities. Here, too, the environment has depleted his bioplasmic growth forces. He therefore begins schooling with weakened and insufficient growth forces. Herbert Sieweke states:

> Any disturbance or change in the etheric (bioplasmic) forces during the formative years of childhood will have an impact on the emotional and intellectual constitution of the child. The metamorphosis of the etheric (bioplasmic) forces from physical development to emotional-cognitive development can be accelerated or retarded. There is a delicate function between the two functions (physical and mental development) of the etheric forces.[30]

When the child matures enough to shift from a lower stage of mental development to a higher level (preoperational to concrete), he does not possess enough growth forces to be changed into forces for thinking to make the transition complete. He is neither out of the preoperational stage nor in the concrete operational stage. He hovers in between. His rate of development is retarded. When these developmental problems are compounded by forced premature learning, the result can only be further retardation, perhaps permanent retardation. On the other hand, Elkind stated that there is no support for:

> The claims of the lastingness of preschool instruction, (but there is) evidence in the opposite direction... The longer we delay formal instruction, up to certain limits, the greater the period of plasticity and higher the ultimate level of achievement.[31]

In connection with this phenomenon, it would be apropo at this point to describe another important biological aspect of the bioplasmic forces. That aspect is the phenomenon of dormancy. I have already indicated the regenerative powers to regrow amputated parts of the physical body in lower animals; and that man does not possess this power, except in the recuperation from illness, and the transmutation of the growth forces into cognitive energy. But the phenomenon of dormant phases seems to be present in all organic matter. Life retires into dormant phases - as in winter buds of plants, seeds

and spores and in the eggs of animals - in which the physical effect of the bioplasmic forces is almost entirely withdrawn or suspended.[32] But it is only temporarily suspended and can be rekindled again. For example, we know that seeds that are hundreds or thousands of years old can germinate into a plant by the application of water and soil.

The same phenomena can occur in human development. Jerome Kagan of Harvard University studied the effects of complete isolation on Guatemalan infants in the first years of their lives.[33] These infants were kept in a dark hut, no contact with any other human being, except physical contact with the mother who nursed them on demand. There was no talk or interaction between mother and infant. After 1 1/2 to 2 years, the infant emerged from confinement very retarded motorically, emotionally and intellectually. Kagan then observed and tested 11 year olds in the village, who had gone through the same child rearing experiences, and found them to be perfectly normal, socially well adjusted, happy and highly intelligent children. Although Kagan was puzzled by his findings because it contradicted and broke all the "rules" on child development, it is apparent to the writer that the isolated low-stimulating environment merely served to temporarily suspend the actions of the bioplasmic forces. When the children were later released to interact with the human and social-culture mileau of the village, the bioplasmic forces, which had been dormant, were rekindled. Using an analogy, one could say, just as soil, moisture and warmth call forth the plant seed into germination, so a social-human environment calls forth the birth and development of the human personality, speech and cognition.

One could conclude that perhaps a hypo-stimulating, low pressure environment is more conducive to human development than a hyper-stimulating, high pressure environment. For man is not only a product of his environment, for in a real sense man is also a victim of his environment.

Therefore the popular educational approaches of today, with their intellectual heavy-handedness, will never allow children to develop and blossom naturally. They can only do damage, making children into premature, unhappy adults. Such approaches will never be able to serve children from different and less desirable economic environments. Education must begin looking at the dynamic needs of the growing child.

Our conventional approaches - pouring knowledge into the child, "fitting him into a curriculum" that is foreign to his nature - must cease. We must examine the needs of the child, how and why he develops as he does. Then what we need is to develop a curriculum and methods compatible with his unfolding and developing stages of growth. The bioplasmic or growth forces theory supports such an approach. It explains human growth, the development of thinking in children, and the rationale for readiness. If the theory is correct, it implies that the educational process should help the child to sustain and develop his bioplasmic body, his forces of growth. A curriculum, extracurricular activities, etc., compatible with and supportive of these growth forces would have to be developed. The bioplasmic theory may be the key to human and child development and the basis for a method of education. The bioplasmic theory merits further research.

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